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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/757,364	01/08/2001	Albert W. Chan	6136-53650	6620

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EXAMINER

HARAN, JOHN T

ART UNIT

PAPER NUMBER

1733

DATE MAILED: 03/20/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/757,364

Applicant(s)

CHAN ET AL.

Examiner

John T. Haran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 17-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 16 is/are rejected.
- 7) ☒ Claim(s) 14 and 15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11. 6) ☐ Other: _____

DETAILED ACTION

1. This action is in response to the amendment filed on 2/6/03. All previous rejections are withdrawn in view of the amendments to the claims and Applicant's arguments.

Specification

2. The disclosure is objected to because of the following informalities:

The "Brief Description of the Drawings" should indicate that there is a Figure 1A and a Figure 1B.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, the phrase "dispensing a liquid polymeric material between a conducting surface on a first substantially planar substrate and a conducting surface on a second substantially planar substrate" renders the claim indefinite because it is unclear what is being claimed. A literal reading of the phrase would indicate that the liquid polymeric material is dispensed in a gap between two surfaces, however in view of the specification it appears the liquid polymeric material is dispensed on a lower

substrate and then an upper substrate is brought in contact with the liquid polymeric material and pressed against it. It is suggested to amend the claim to more clearly indicate Applicant's invention.

Claim 1 is also rendered indefinite by the phrase "the liquid polymeric [material] being disposed inwardly from the edges of the first and second substrate" because it is unclear what is being claimed. In view of the specification it appears the liquid polymeric material is dispensed concentrically over the center of the lower substrate without covering the entire lower substrate and is subsequently pressed between the two substrates to flow towards the edges and completely fill the space between the two substrates. It is suggested to amend the claims to indicate such.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami (U.S. Patent 6,133,066).

Murakami discloses a method for attaching a semiconductor element to a circuit board wherein a semiconductor element (planar substrate) with conductive electrode bumps is aligned with a circuit board (planar substrate) having conductive mounting pads so that the bumps and mounting pads are aligned, then a sealing epoxy resin

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(liquid polymeric material), which acts as an underfill, is supplied to the circuit board, then the semiconductor element is pressed to spread the resin outward such that the bumps contact the mounting pads, and then the resin is cured (Column 4, line 50 to Column 5, line 11; Figures 1G-1H). Murakami is silent towards one substrate to another using the disclosed method.

One skilled in the art would have readily appreciated that both Murakami and the present application are both directed to bonding two conducting surfaces wherein liquid polymeric material is dispensed on the lower surface without covering the entire surface and the upper surface is pressed against the liquid polymeric material causing the liquid polymeric material to flow toward the edges and fill the space between the two surfaces. One skilled in the art would have readily appreciated that the method of Murakami would work whether the upper surface was the surface of a chip or the surface of a substrate because both a substantially planar and posses conducting surfaces such as contact pads. One skilled in the art also would have readily appreciated that the surface area to be bonded between two substrate would be larger than a chip and a substrate and would have readily appreciated applying the necessary amount of adhesive to achieve the desired bond. It would have been obvious to one of ordinary skill in the art at the time the invention was made to bond two substrate surfaces in the method of Murakami.

Regarding claim 2, Murakami teaches that the conducting surfaces contact each other after pressing the liquid polymeric material.

Regarding claims 3 and 4, Murakami is silent towards the polymeric material being dispensed on a plurality of dies present on one of the substrates or towards one of the substrates having a planar surface area of at least about 36 square inches. It is well known and conventional in the art for substrates, such as circuit boards, to have a planar surface of at least about 36 square inches and for circuit boards to have a plurality of die areas to be electrically connected to another surface. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use well known and conventional techniques in the art such as using a circuit board with a planar surface area of at least about 36 square inches or for the substrate to have a plurality of dies areas to be electrically connected to another surface in the method of Murakami, as modified above.

Regarding claims 5 and 6, Murakami is also silent towards the electrode bumps being made of solder with a fluxing agent however it is notoriously well known and conventional for electrode bumps to be made of solder and for the solder bumps to contain a solder material fluxing agent. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the electrode bumps be solder bumps that contain a solder material fluxing agent in the method of Murakami.

7. Claims 7-9 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami (U.S. Patent 6,133,066) as applied to claims 1-6 above, and further in view of Wang (U.S. Patent 6,476,676) or Konarski et al (U.S. Patent 6,458,472).

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Murakami is silent towards the underfill epoxy sealing resin containing a polymer fluxing agent. It is well known and conventional for underfill epoxy sealing resins to contain polymer fluxing agents and for the underfill material to comprise from about 15% by weight to 70% by weight of a polymeric resin, about 15% to 70% by weight of a curing agent, and from 0.10% to 20% by weight of fluxing agent, as shown for example in Wang (See Examples) and Konarski et al (Column 4, lines 26-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use well known and conventional underfill resin in the method of Murakami, as modified above.

8. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami (U.S. Patent 6,133,066) as applied to claims 1-6 above, and further in view of Wang (U.S. Patent 6,476,676) or Konarski et al (U.S. Patent 6,458,472) as applied to claims 7-9 above, and further in view of Stefanowski (U.S. Patent 5,334,260).

It is well known and conventional to use phenylacids such as phenylacetic acid in fluxing agents, as shown for example in Stefanowski (Column 3, lines 20-28). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use well known and conventional fluxing agents in the method of Murakami, as modified above.

9. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (U.S. Patent 5,873,161).

Chen et al are directed to a method of bonding two substantially planar substrates (62,63) together having conducting surfaces (64,65) wherein solder bump (70') is formed on the top substrate (62), one of the substrates is covered with a polymeric material (74), the two substrates are pressed together and the polymeric material flows so as to be displaced outward from between the solder bump and the contact pad, and then the polymeric material is cured (See Figures 3a-3h).

It is unclear if the polymeric material is applied as a liquid, however it is caused to flow when the substrates are pressed together (Column 6, lines 60-67; Column 7, lines 30-35). However one skilled in the art would have readily appreciated the adhesive does flow during the pressing and therefore is liquid and whether or not the adhesive was applied as liquid or applied as a solid and heated to flow during pressing, the two are alternate expedients that are obvious over one another. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the adhesive as a liquid in the method of Chen et al.

Regarding claim 2, Chen et al teaches that the conducting surfaces contact each other after pressing the adhesive.

Regarding claims 3 and 4, Chen et al are silent towards the polymeric material being dispensed on a plurality of dies present on one of the substrates or towards one of the substrates having a planar surface area of at least about 36 square inches. It is well known and conventional in the art for substrates, such as circuit boards, to have a planar surface of at least about 36 square inches and for circuit boards to have a plurality of die areas to be electrically connected to another surface. It would have been

obvious to one of ordinary skill in the art at the time the invention was made to use well known and conventional techniques in the art such as using a circuit board with a planar surface area of at least about 36 square inches or for the substrate to have a plurality of dies areas to be electrically connected to another surface in the method of Chen et al, as modified above.

Regarding claims 5 and 6, Chen et al teaches having solder bumps and fluxing agent (Column 5, line 60 to Column 6, line 17).

10. Claims 7-9 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (U.S. Patent 5,873,161) as applied to claims 1-6 above, and further in view of Wang (U.S. Patent 6,476,676) or Konarski et al (U.S. Patent 6,458,472).

Chen et al are silent towards the underfill epoxy sealing resin containing a polymer fluxing agent. It is well known and conventional for underfill epoxy sealing resins to contain polymer fluxing agents and for the underfill material to comprise from about 15% by weight to 70% by weight of a polymeric resin, about 15% to 70% by weight of a curing agent, and from 0.10% to 20% by weight of fluxing agent, as shown for example in Wang (See Examples) and Konarski et al (Column 4, lines 26-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use well known and conventional underfill resin in the method of Chen et al, as modified above.

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11. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (U.S. Patent 5,873,161) as applied to claims 1-6 above, and further in view of Wang (U.S. Patent 6,476,676) or Konarski et al (U.S. Patent 6,458,472) as applied to claims 7-9 above, and further in view of Stefanowski (U.S. Patent 5,334,260).

It is well known and conventional to use phenylacids such as phenylacetic acid in fluxing agents, as shown for example in Stefanowski (Column 3, lines 20-28). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use well known and conventional fluxing agents in the method of Chen et al, as modified above.

Allowable Subject Matter

12. Claims 14 and 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter:

The prior art fails to suggest a fluxing agent comprising a beta phenylacrylic acid and a beta phenylhydroxyacrylic acid. Absent any art showing a fluxing agent comprising both types of acids the subject matter of claims 14 and 15 are considered allowable.

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Response to Arguments

14. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

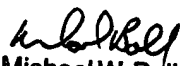
15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John T. Haran** whose telephone number is **(703) 305-0052**. The examiner can normally be reached on M-Th (8 - 5) and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael W. Ball can be reached on (703) 308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.


John T. Haran

March 17, 2003


Michael W. Ball
Supervisory Patent Examiner
Technology Center 1700